

ABSTRACT OF THE DISCLOSURE

The invention disclosed is a compact and lightweight hybrid pneumatic-magnetic isolator-actuator capable of large force, substantial stroke and bandwidth actuation with near frictionless operation and vibration isolation with very low break frequency. Pneumatic and magnetic forces are applied to a single carriage comprised primarily of a coaxially arranged air piston and coil. The carriage is driven relative to a frame or housing including an internally mounted cylindrical piston sleeve and magnetic actuator body. A combination of air bearings and air bearing piston construction provide for frictionless motion of the carriage relative to the frame. The pneumatic piston provides the actuation force for both static loads and low frequency dynamic loads. An integrally mounted sensor and control unit determine the pressure error resulting at the pneumatic piston. The control unit utilizes the pressure error to drive a high bandwidth magnetic actuation capability in parallel with the pneumatic actuation capability. An air tank of prescribed volume may be connected to the pneumatic piston for effecting a desired air-spring stiffness upon the isolator-actuator.